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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Paul Martin Schorn *et al.*

Serial No.: 10/041,602

Art Unit: 1764

Filed: January 10, 2002

Examiner: Unassigned

For: CONTINUOUS VACUUM PAN

Attorney Docket No.: 3594-042

**CLAIM TO PRIORITY**  
**TRANSMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

**RECEIVED**  
MAY 8 2002  
TC 1700

Enclosed is a certified copy of the South African Patent Application No. 2000/2746 filed on June 1, 2000, in South Africa, from which priority is being claimed in this application.

No fee is believed to be due for this submission. Should any fee be required, however, please charge the required fee to Pennie & Edmonds LLP Deposit Account No. 16-1150.

Respectfully submitted,

*Seth A. Watkins*

Date May 7, 2002

*FOR: Marcia H. Sundeen*

Seth A. Watkins                      Reg. No. 47,169  
*For:* Marcia H. Sundeen                      Reg. No. 30,893

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Enclosure

*Sertifikaat*

PATENTKANTOOR

REPUBLIC OF SOUTH AFRICA

DEPARTEMENT VAN  
HANDEL EN NYWERHEID



*Certificate*

PATENT OFFICE

REPUBLIEK VAN SUID-AFRIKA

DEPARTMENT OF TRADE  
AND INDUSTRY

Hiermee word gesertifiseer dat  
This is to certify that

the documents attached hereto are true copies of the Forms P2, P6,  
provisional specification and drawings of South African Patent Application  
No. 2000/2746 in the name of The Tongaat - Hulett Group Limited

Filed	:	1 June 2000
Entitled	:	Continuous Vacuum Pan

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MAY 8 2002  
TC 1700

Geteken te  
Signed at

PRETORIA

in die Republiek van Suid-Afrika, hierdie  
in the Republic of South Africa, this

18th

dag van  
day of

April 2002

Registrateur van Patente  
Registrar of Patents

2002/2746

REPUBLIC OF SOUTH AFRICA			REGISTER OF PATENTS			PATENTS ACT,		
OFFICIAL APPLICATION				LODGING DATE: PROVISIONAL			ACCEPTANCE DATE	
21	01	20002746		22	01.06.2000		47	
INTERNATIONAL CLASSIFICATION				LODGING DATE: COMPLETE			GRANTED DATE	
51				23				
FULL NAME(S) OF APPLICANT(S)/PATENTEE(S)								
71	THE TONGAAT-HULETT GROUP LIMITED							
APPLICANTS SUBSTITUTED:							DATE REGISTERED	
71								
ASSIGNEE(S)							DATE REGISTERED	
71								
FULL NAME(S) OF INVENTOR(S)								
72	SCHORN, Paul; SMITH, Leon							
PRIORITY CLAIMED			COUNTRY		NUMBER		DATE	
N.B. Use International abbreviation for country (see Schedule 4)			33	NIL	31	NIL	32	NIL
TITLE OF INVENTION								
54	CONTINUOUS VACUUM PAN							
ADDRESS OF APPLICANT(S)/PATENTEE(S)								
309 UMHLANGA ROCKS DRIVE, LA LUCIA, KWA-ZULU NATAL, SOUTH AFRICA								
ADDRESS FOR SERVICE							S AND F REF	
74	SPOOR AND FISHER, SANDTON						JP/T 585/HM/jw	
PATENT OF ADDITION NO.				DATE OF ANY CHANGE				
61								
FRESH APPLICATION BASED ON				DATE OF ANY CHANGE				

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978  
APPLICATION FOR A PATENT  
AND ACKNOWLEDGEMENT OF RECEIPT  
(Section 30 (1) - Regulation 22)

PUBLIC OF SOUTH AFRICA  
REVENUE FORM P.1

R 060.00

The granting of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION NO.

21	01	20002746
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JP/T 585/HM/jw

FULL NAME(S) OF APPLICANT(S)

71	THE TONGAAT-HULETT GROUP LIMITED
----	----------------------------------

ADDRESS(ES) OF APPLICANT(S)

309 UMHLANGA ROCKS DRIVE, LA LUCIA, KWA-ZULU NATAL, SOUTH AFRICA	REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT
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TITLE OF INVENTION

54	CONTINUOUS VACUUM PAN	2000 -06- 01
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THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2 THE EARLIEST PRIORITY CLAIM IS:

COUNTRY: NIL	NUMBER: NIL	DATE: NIL
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THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.

21	01	
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THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND IS BASED ON APPLICATION NO.

21	01	
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THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. A single copy of a provisional specification of 7 pages.
- ☒ 2. Drawings of 9 sheets.
- ☐ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☐ 4. A copy of Figure ..... of the drawings (if any) for the abstract.
- ☐ 5. An assignment of invention.
- ☐ 6. Certified priority document(s) .....
- ☐ 7. Translation of the priority document(s).
- ☐ 8. An assignment of priority rights.
- ☐ 9. A copy of the Form P.2 and the specification of S.A. Patent Application No.
- ☐ 10. A declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☒ 13. Form P.2 in duplicate.

74	ADDRESS FOR SERVICE: SPOOR AND FISHER, SANDTON
----	--

Dated: 01.06.2000

*[Signature]*  
SPOOR AND FISHER  
PATENT ATTORNEYS FOR THE APPLICANT(S)

REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT
2000 -06- 01
REGISTRATEUR VAN PATENTE, MODELLE, HANDELSMERKE EN GITEURSREG
REGISTRAR OF PATENTS

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

## PROVISIONAL SPECIFICATION

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO.

LODGING DATE

21	01	20002746
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22	01.06.2000
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FULL NAME(S) OF APPLICANT(S)

71	THE TONGAAT-HULETT GROUP LIMITED
----	----------------------------------

FULL NAME(S) OF INVENTOR(S)

72	SCHORN, Paul; SMITH, Leon
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TITLE OF INVENTION

54	CONTINUOUS VACUUM PAN
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### FIELD OF THE INVENTION

This invention relates to a vacuum pan.

### SUMMARY OF THE INVENTION

According to the invention a vacuum pan includes a housing, at least one liquid heating pan within the housing, a calandria within the liquid heating pan and a heating vapour conduit located substantially centrally relative to the calandria, the liquid heating pan comprising a plurality of compartments located in series with one another, with each compartment being in vapour communication with the heating vapour conduit.

In the preferred form of the invention the compartments are separated from one another by radially extending baffles.

The calandria is preferably circular in plan view and is preferably a vertical tube calandria.

The vacuum pan may include an upper liquid heating pan located above a lower liquid heating pan, with each liquid heating pan having a calandria located therein. Preferably in such an arrangement, the heating vapour conduit is common to each calandria. However, each calandria may have its own separate vapour heating supply. The calandrias may be located in series with one another. Thus one of the compartments of a calandria located in the upper pan would be in liquid communication with one of the compartments of a calandria located in the lower pan.

The pans located one on top of the other are preferably also in vapour communication with one another so that vapour generated by the heating of

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the liquid in the lower pan can be removed from the pan together with vapour generated by the heating of the liquid in the upper pan via a common vapour zone located above the upper pan. In one form of the invention the vapour communication is achieved by at least one peripherally extending passageway located between the housing and the upper pan. In another form of the invention, the vapour communication is achieved by ducts located externally to the housing. However in the preferred form of the invention the vapour communication is achieved by a plurality of conduits located between the housing and the upper pan, each conduit being in communication with its own compartment in the lower pan.

Each liquid heating pan may have a substantially W-shaped floor.

The vacuum pan may have only one liquid heating pan or two or more liquid heating pans stacked on top of one another.

#### EF DESCRIPTION OF THE DRAWINGS

**Figure 1** is a partly cut away side view of a vacuum pan according to the invention with an internal condenser;

**Figure 2** is an enlarged view of the vacuum pan of figure 1;

**Figure 3** is a cross-sectional plan view on line III – III of figure 2;

**Figure 4** is a cross-sectional plan view on line IV – IV of figure 2;

**Figure 5** is a cross-sectional plan view on line V – V of figure 2;

**Figure 6** is a cross-sectional side view of a vacuum pan according to

another aspect of the invention;

**Figure 7** is a cross-sectional plan view on line VII – VII of figure 6;

**Figure 8** is a cross-sectional side view of a vacuum pan according to a further aspect of the invention; and

**Figure 9** is a cross-sectional plan view on line IX – IX of figure 8.

#### DETAILED DESCRIPTION OF THE DRAWINGS

A double calandria continuous vacuum pan 10 with an integral condenser is shown in figure 1.

Referring now to figures 2 to 5, the pan 10 includes an outer housing 14, a lower massecuite heating pan 16, an upper massecuite heating pan 18, and a centrally located heating vapour conduit 20.

The lower and upper pans 16 and 18 each contain a circular calandria 22 and 24 respectively. The upper pan 18 is divided into six compartments 26.1 to 26.6 by baffles 28. The baffles 28 extend radially from the conduit 20. The compartments 26.1 to 26.6 communicate with one another via apertures 30 in the baffles 28. Small baffles 32 are located one on either side of each aperture 30. The compartments 26.1 to 26.6 are thus located in series with one another.

The lower pan 16 is also divided up into six compartments 34.1 to 34.6 by baffles 36. As can be seen from figures 3 and 4, the compartments in the upper pan 18 are angularly offset relative to the compartments in the lower pan 16. This angular offset allows the upper compartment 26.6 to



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communicate with the lower compartment 34.1 by conduit 40. Thus the upper compartments are located in series with the lower compartments. The flow of massecuite through the compartments is indicated by arrows 42.

The lower pan 16 is in vapour communication with the upper pan 18 via peripherally extending passageways 44 located between the upper pan 18 and the outer housing 14. The passageways 44 discharge into a common vapour zone 45 located above the upper pan 18.

The heating vapour conduit 20 communicates with each compartment via apertures 46 in the conduit 20. Thus each compartment has its own heating vapour or steam supply.

The calandrias 22 and 24 each have non-condensable gas collection pipes 48 connected to outlet pipes 50 through which the non-condensable gases are removed from the calandrias. Condensate is removed from the calandrias via pipe 51. The non-condensable gas collection pipes 48 may be in ring form as shown or a number of radially extending pipes may be used instead.

A breather tube 52 is provided for conveying non-condensable gases which collect in a conical zone 54 of the lower compartment to the common vapour zone 45.

Each compartment in the upper pan 18 has a molasses inlet in the form of a pipe 56 discharging into a distributor box 58.

The upper compartment 26.1 has a seed inlet in the form of a pipe 60. The seed consists of sugar crystals in syrup. The seed may be introduced into the top or the bottom of the upper compartment 26.1.

Each compartment in the lower pan 16 has jigger steam inlets in the form of

pipes 62, and a single molasses inlet in the form of a pipe 64 discharging into a distributor box 66. Jigger steam inlets may also be fitted to the compartments in the upper pan 18.

A massecuite outlet box 68 is provided adjacent the lower compartment 34.6. The outlet box 68 contains an adjustable height weir 70 for varying the position of the massecuite level in the lower pan 16. The massecuite level in the upper and lower pans is shown by lines 72.

Both the upper and lower pans have W-shaped bottoms 74 to facilitate the flow of massecuite therein. In use, the massecuite in each compartment flows upwardly through vertical tubes 76 in the calandrias and then downwardly through a gap 78 between the calandrias and the outer housing, along the W-shaped bottom 74 and back up into the vertical tubes 76. Vapour generated as the massecuite boils flows upwardly from each of the lower compartments through the peripherally extending passageways 44 to the common vapour zone 45 where, together with the vapour generated in the upper compartments, it is drawn off into the integral condenser 12 and condensed to maintain a pressure in the pans which is lower than the ambient pressure. Instead of an integral condenser 12, an external condenser may be utilized.

The massecuite within the pans is maintained in a super-saturated condition to ensure crystallisation of the sugar. The massecuite flows from one compartment to the next in substantially plug flow fashion to enhance the crystallisation process.

Referring now to figures 6 and 7, a vacuum pan 10.1 is the same as vacuum pan 10 except, instead of the vapour passageways 44, it has three external ducts 80. The inlet to each external duct 80 straddles a pair of compartments in the lower pan.

- 6 -

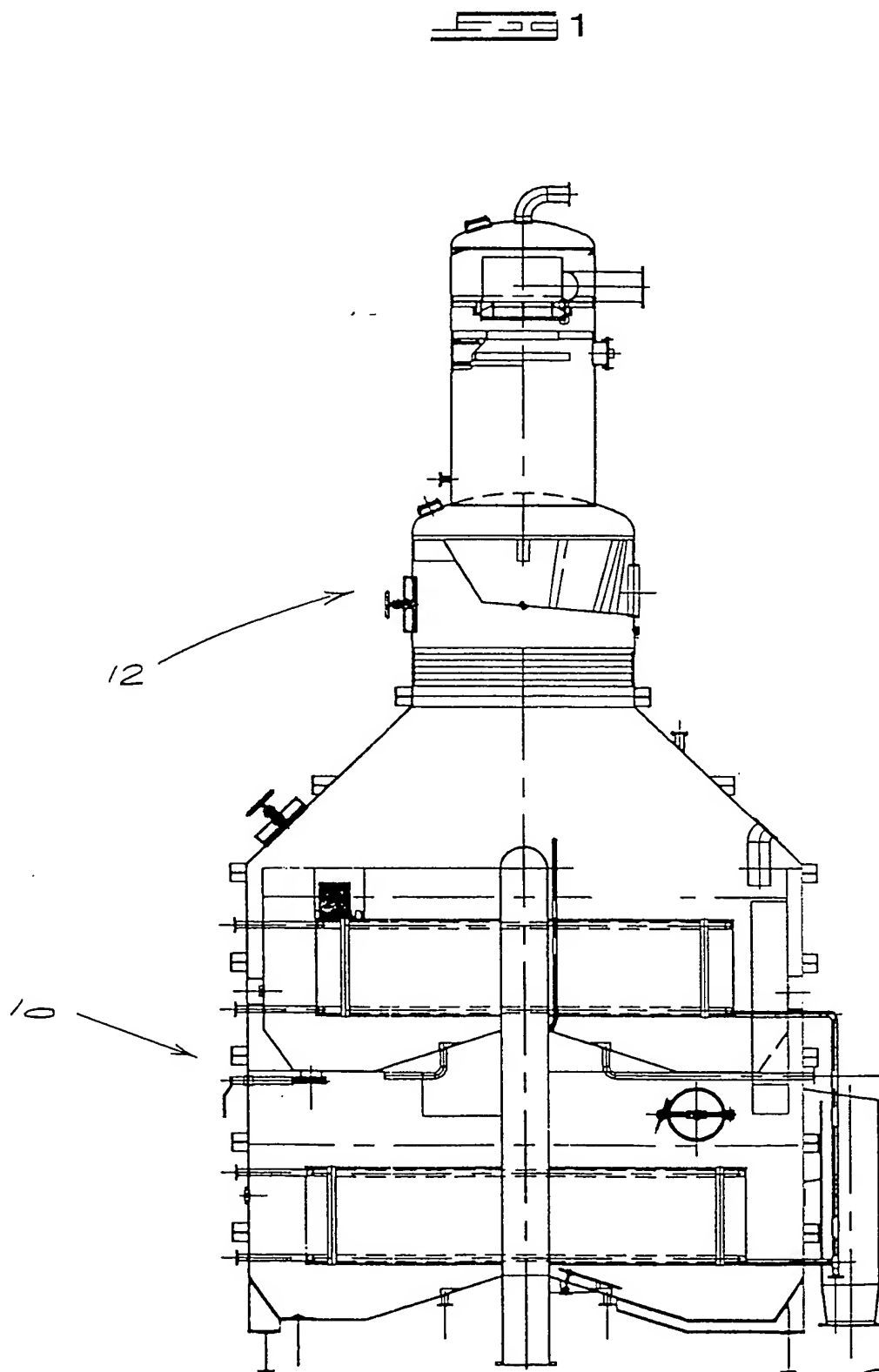
Referring now to figures 8 and 9, a vacuum pan 10.2 is the same as the vacuum pan 10 except, that instead of the vapour passageways 44, it has quarter-round, vapour conduits 82. Each compartment in the lower pan has its own vapour conduit 82 as can be seen from figure 9.

It will be appreciated that many modifications or improvements of the invention are possible without departing from the spirit or scope of the invention.

DATED THIS 1<sup>st</sup> DAY OF JUNE 2000.

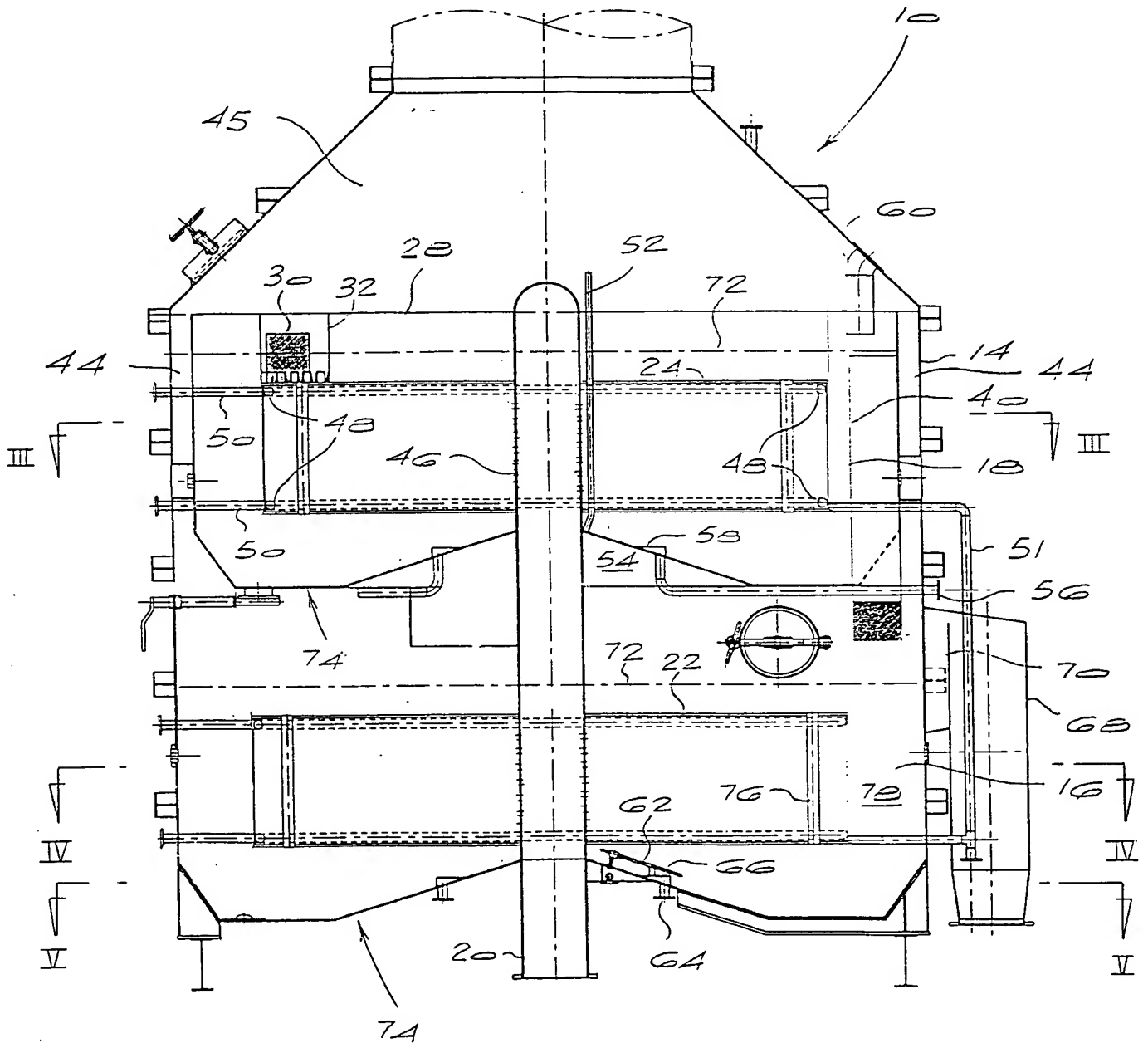


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APPLICANT'S PATENT ATTORNEYS



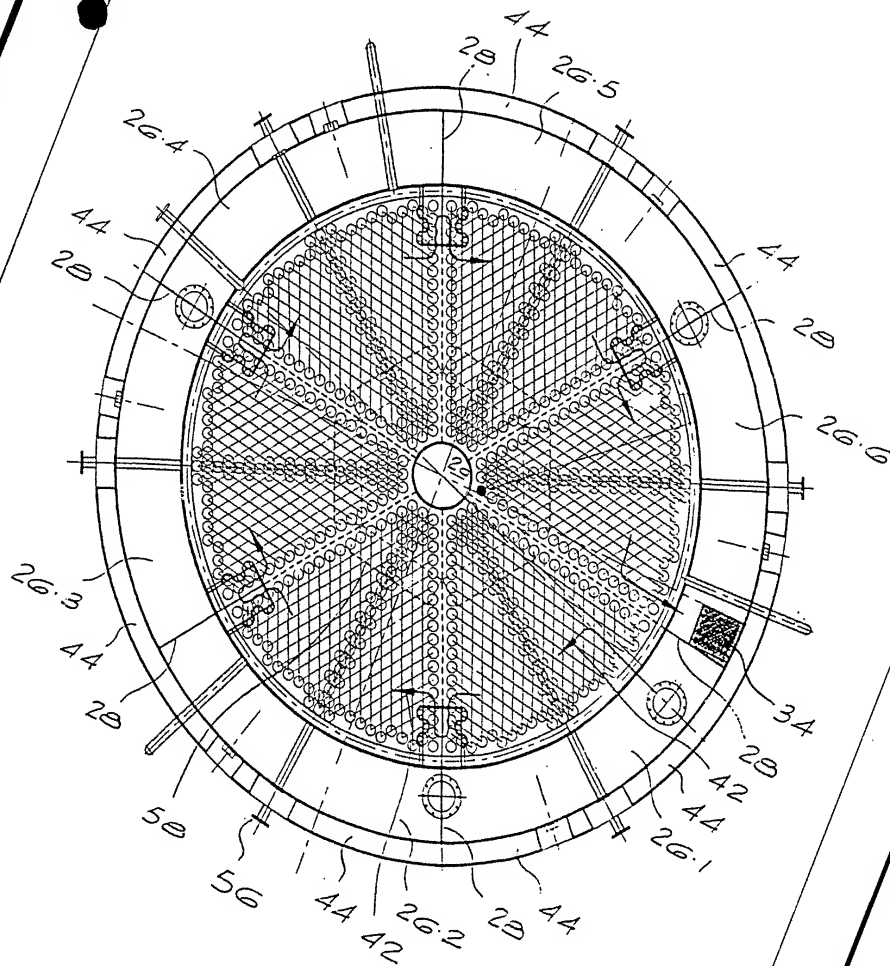
*W. H. M. S. P. S.*  
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APPL. CANT'S PATENT ATTORNEYS

FIG 2



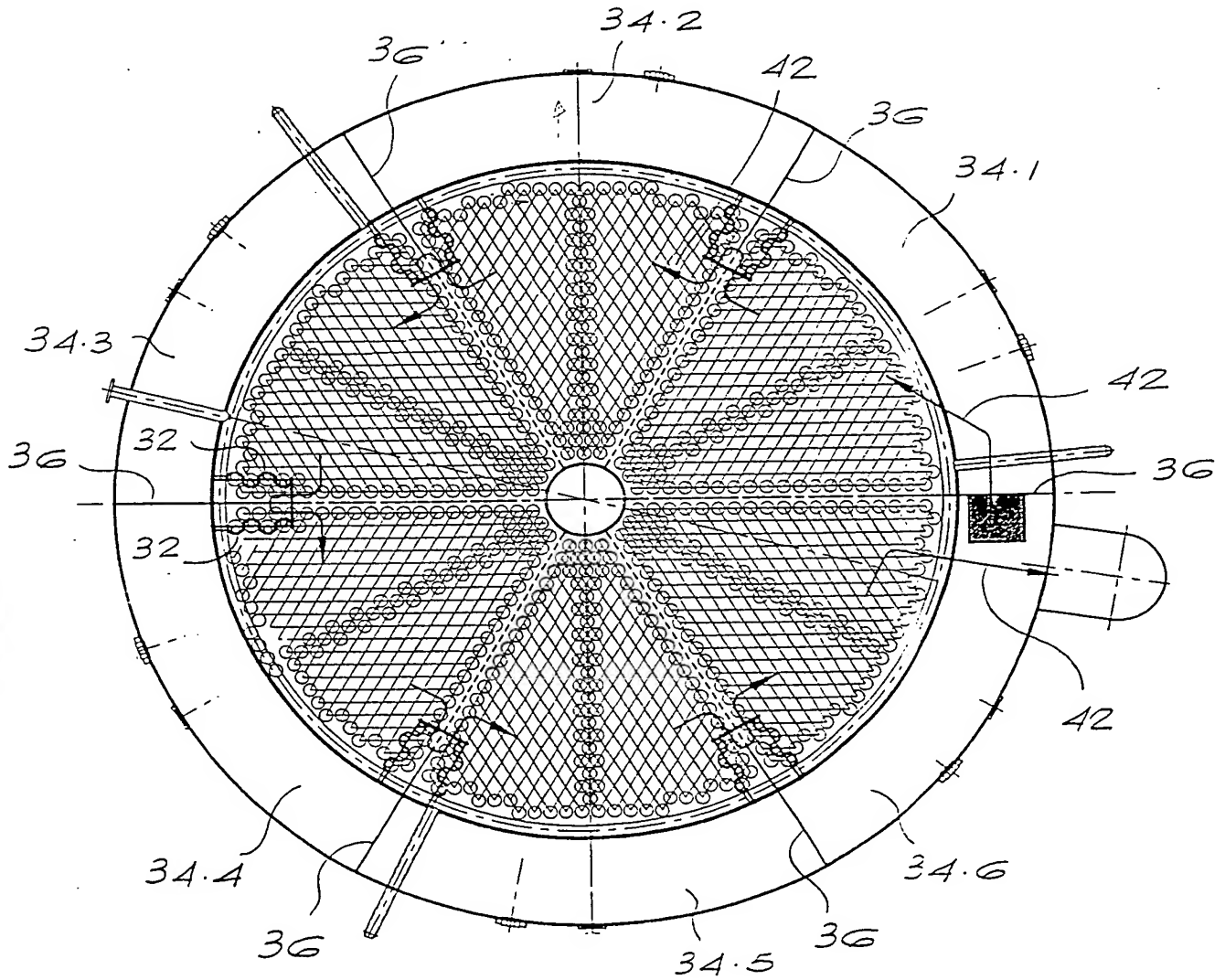
*Spoor and Fisher*  
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FIG 3



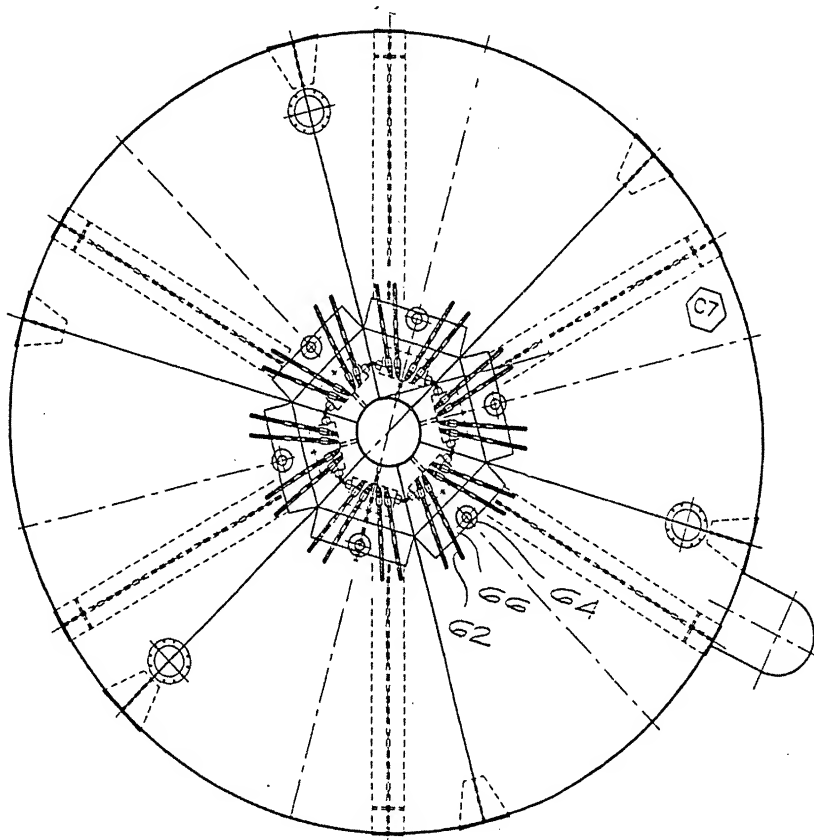
*[Signature]*  
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Fig 4



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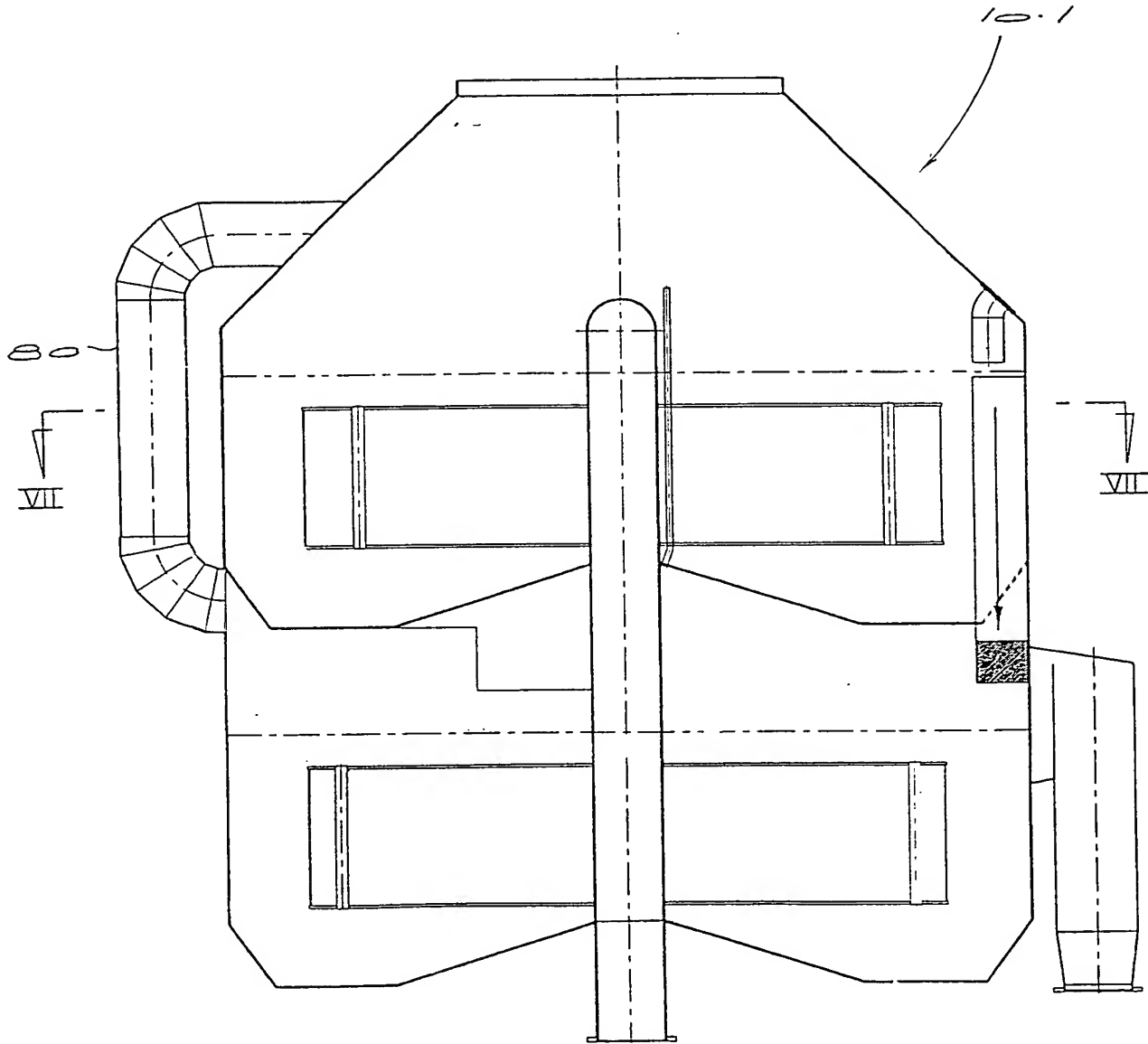
FIG 5



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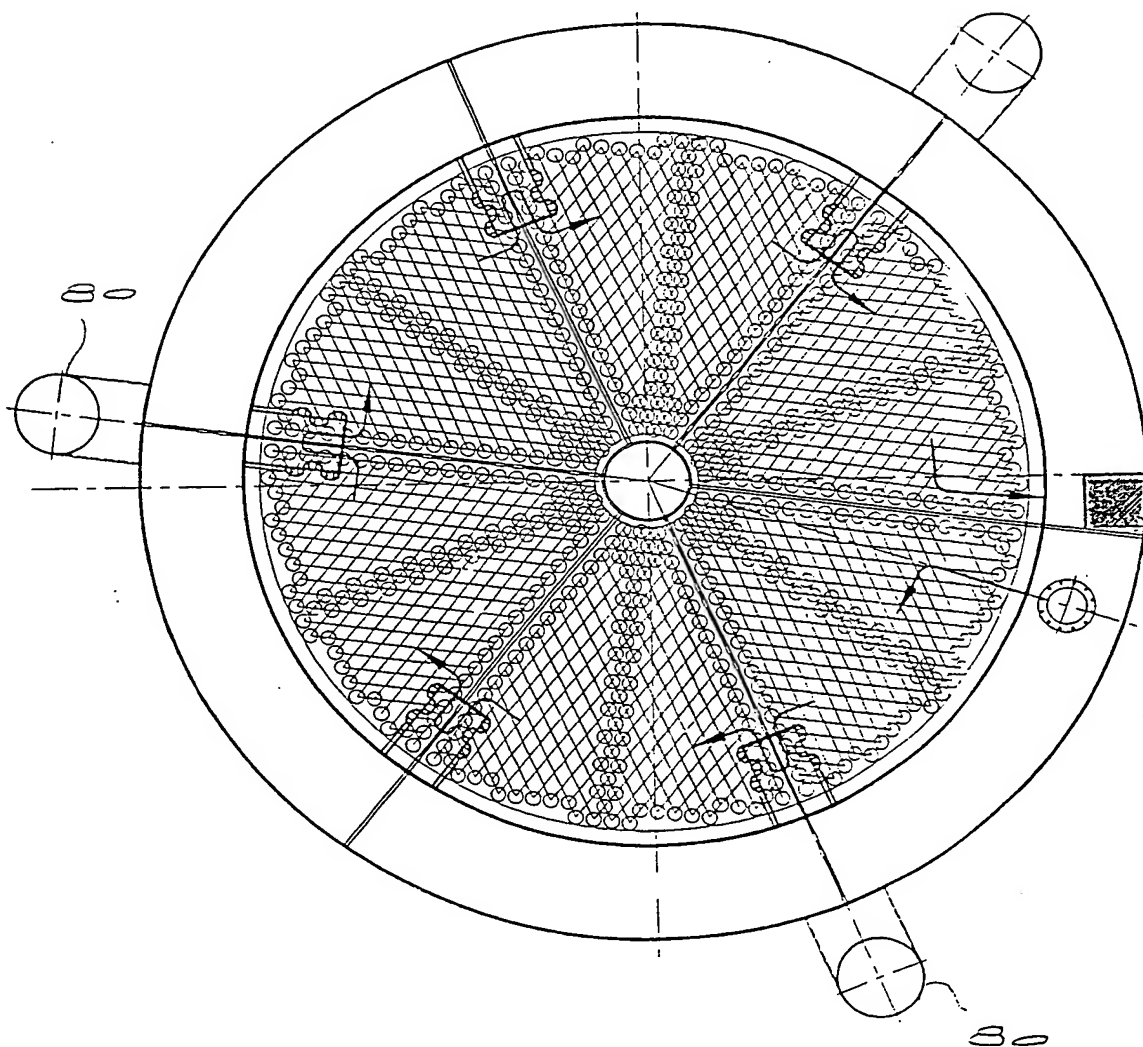


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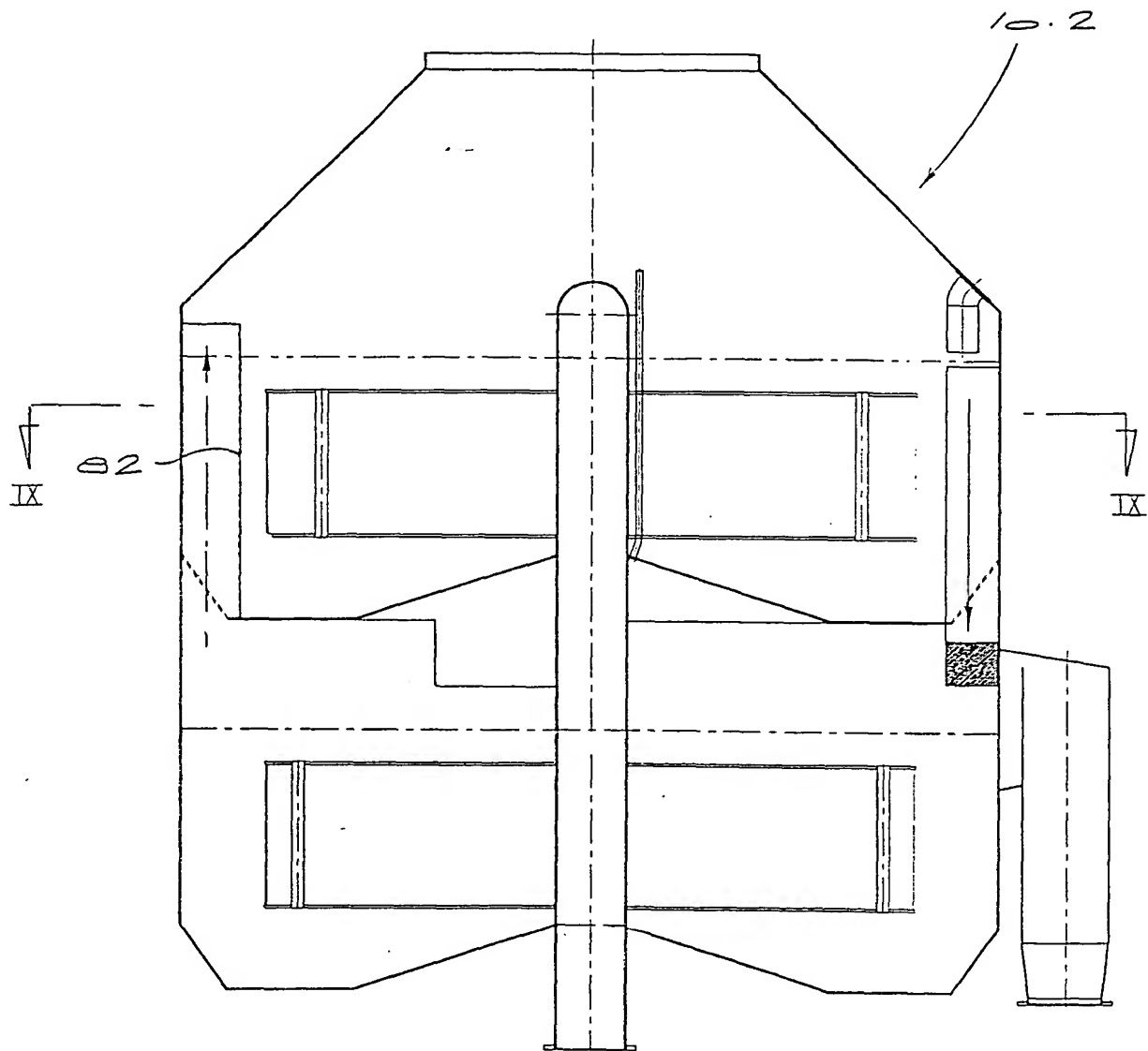
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Fig 7



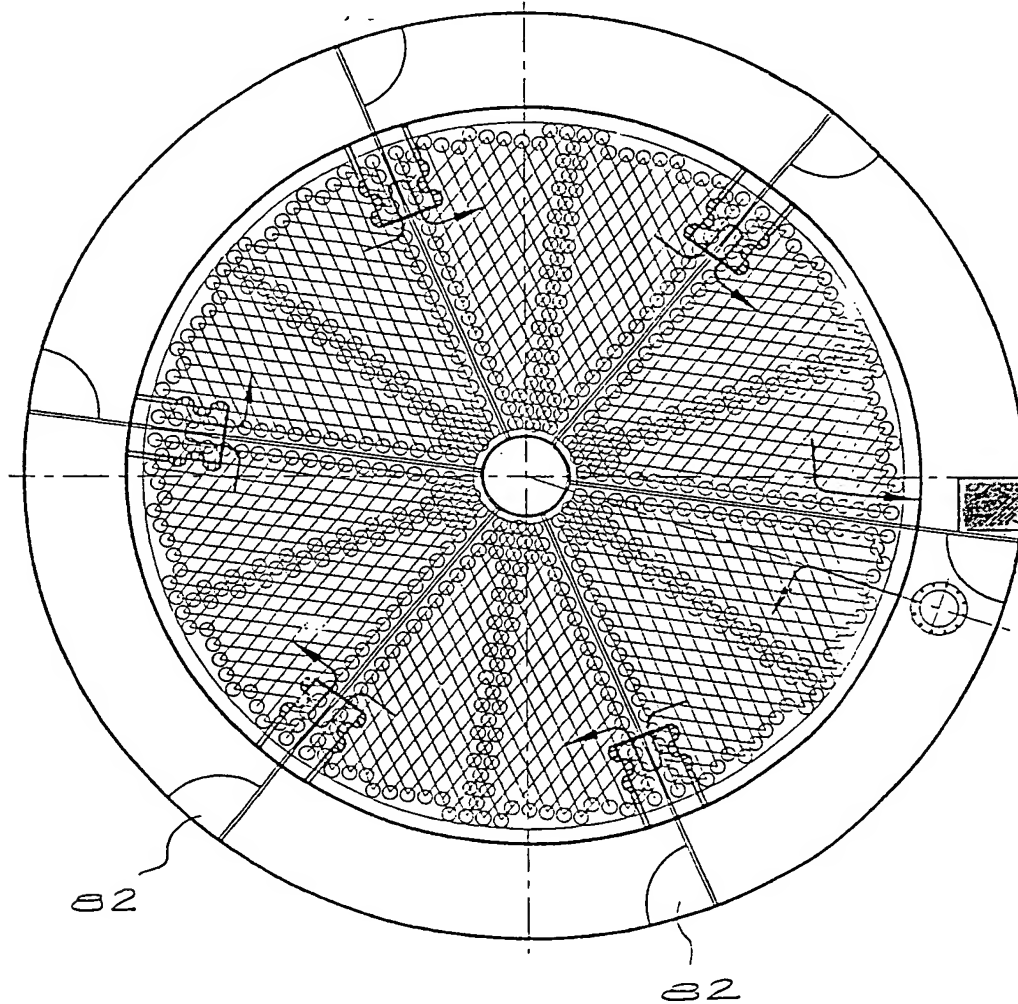
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FIG 8



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FIG 9



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